

Amendments to the Claims:

This listing of the claims will replace all prior versions, and listings, of claims in the application:

Listing of the Claims:

Claims 1-18 (Canceled).

19. (Currently amended) ~~The flexible pipe joint as claimed in claim 13,~~

A flexible pipe joint for conveying production fluid greater than 180 °F in a subsea environment, the flexible pipe joint comprising:

a body;

an extension pipe;

a laminated elastomeric flex element coupling the extension pipe to the body, the laminated elastomeric flex element having alternate elastomer layers and reinforcement layers, the elastomer layers including inner elastomer layers near to the extension pipe and outer elastomer layers away from the extension pipe, wherein the inner elastomer layers have greater shear area than the outer elastomer layers and the inner elastomer layers have a higher shear modulus than the outer elastomer layers to shift strain from the inner elastomer layers to the outer elastomer layers; and

a heat shield disposed in the extension pipe in the vicinity of the laminated elastomeric flex element;

wherein the heat shield includes non-metallic material inserted into the extension pipe [-] and a multi-section ring engaging the extension pipe and disposed over the non-metallic material inserted into the extension pipe for retaining the non-metallic material inserted into the extension pipe.

20. (Previously presented) The flexible pipe joint as claimed in claim 19, which includes at least one force-fitted pin disposed in a section of the multi-section ring and in the non-metallic material inserted into the extension pipe.

21. (Previously presented) The flexible pipe joint as claimed in claim 19, wherein the multi-section ring is disposed under a metal retaining ring welded to the extension pipe.

22. (Currently amended) ~~The flexible pipe joint as claimed in claim 13;~~
A flexible pipe joint for conveying production fluid greater than 180 °F in a subsea environment, the flexible pipe joint comprising:

a body;

an extension pipe;

a laminated elastomeric flex element coupling the extension pipe to the body, the laminated elastomeric flex element having alternate elastomer layers and reinforcement layers,

the elastomer layers including inner elastomer layers near to the extension pipe and outer elastomer layers away from the extension pipe, wherein the inner elastomer layers have greater shear area than the outer elastomer layers and the inner elastomer layers have a higher shear modulus than the outer elastomer layers to shift strain from the inner elastomer layers to the outer elastomer layers; and

a heat shield disposed in the extension pipe in the vicinity of the laminated elastomeric flex element;

wherein the extension pipe has a hemispherical portion in the vicinity of the laminated elastomeric flex element and a cylindrical portion away from the laminated elastomeric flex element, the heat shield includes a hemispherical portion mating with an inner profile of the hemispherical portion of the extension pipe, and the heat shield includes a cylindrical portion extending into the cylindrical portion of the extension pipe.

Claims 23-29 (Canceled).

30. (Currently amended) ~~The flexible pipe joint as claimed in claim 26;~~

A flexible pipe joint for conveying production fluid greater than 180 °F in a subsea environment, the flexible pipe joint comprising:

a body;

an extension pipe; and

a laminated elastomeric flex element coupling the extension pipe to the body, the laminated elastomeric flex element having alternate elastomer layers and reinforcement layers, the elastomer layers including inner elastomer layers near to the extension pipe and outer elastomer layers away from the extension pipe, wherein the inner elastomer layers have greater shear area than the outer elastomer layers and the inner elastomer layers have a higher shear modulus than the outer elastomer layers to shift strain from the inner elastomer layers to the outer elastomer layers;

wherein the body contains a bellows secured to an end of the extension pipe within the body, the body defines an inner annulus about the bellows, and the inner annulus is filled with a substantially incompressible fluid; and

which includes at least one baffle attached to the body and extending into the inner annulus in the vicinity of the bellows and the laminated elastomeric flex element.

Claims 31-42 (Canceled).

43. (Currently amended) ~~The flexible pipe joint as claimed in claim 33;~~

A flexible pipe joint for conveying production fluid greater than 180 °F in a subsea environment, the flexible pipe joint comprising:

a body;

an extension pipe; and

a laminated elastomeric flex element coupling the extension pipe to the body, the laminated elastomeric flex element having alternate elastomer layers and reinforcement layers, the elastomer layers including inner elastomer layers near to the extension pipe and outer elastomer layers away from the extension pipe, wherein the inner elastomer layers have a higher shear modulus than the outer elastomer layers to shift strain from the inner elastomer layers to the outer elastomer layers; and

a heat shield disposed in the extension pipe in the vicinity of the laminated elastomeric flex element;

wherein the heat shield includes non-metallic material inserted into the extension pipe and a multi-section ring engaging the extension pipe and disposed over the non-metallic material inserted into the extension pipe for retaining the non-metallic material inserted into the extension pipe.

44. (Previously presented) The flexible pipe joint as claimed in claim 43, which includes at least one force-fitted pin disposed in a section of the multi-section ring and in the non-metallic material inserted into the extension pipe.

45. (Previously presented) The flexible pipe joint as claimed in claim 43, wherein the multi-section ring is disposed under a metal retaining ring welded to the extension pipe.

46. (Currently amended) ~~The flexible pipe joint as claimed in claim 33;~~

A flexible pipe joint for conveying production fluid greater than 180 °F in a subsea environment, the flexible pipe joint comprising:

a body;

an extension pipe; and

a laminated elastomeric flex element coupling the extension pipe to the body, the laminated elastomeric flex element having alternate elastomer layers and reinforcement layers, the elastomer layers including inner elastomer layers near to the extension pipe and outer elastomer layers away from the extension pipe, wherein the inner elastomer layers have a higher shear modulus than the outer elastomer layers to shift strain from the inner elastomer layers to the outer elastomer layers; and

a heat shield disposed in the extension pipe in the vicinity of the laminated elastomeric flex element;

wherein the extension pipe has a hemispherical portion in the vicinity of the laminated elastomeric flex element and a cylindrical portion away from the laminated elastomeric flex element, the heat shield includes a hemispherical portion mating with an inner profile of the hemispherical portion of the extension pipe, and the heat shield includes a cylindrical portion extending into the cylindrical portion of the extension pipe.

Claims 47-52 (Canceled).

53. (Currently amended) ~~The flexible pipe joint as claimed in claim 49;~~

A flexible pipe joint for conveying production fluid greater than 180 °F in a subsea environment over a service life in excess of twenty years, the flexible pipe joint comprising:

a body;

an extension pipe;

a laminated elastomeric flex element coupling the extension pipe to the body, the laminated elastomeric flex element having alternate elastomer layers and reinforcement layers including inner elastomer layers near to the extension pipe and outer elastomer layers away from the extension pipe, wherein the laminated elastomeric flex element is constructed to shift strain from the inner elastomer layers to the outer elastomer layers; and

a heat shield disposed in the extension pipe in the vicinity of the laminated elastomeric flex element;

wherein the extension pipe is made of nickel-chromium-iron alloy in the vicinity of the laminated elastomeric flex element,

wherein the body contains a bellows secured to an end of the extension pipe within the body, the body defines an inner annulus about the bellows, and the inner annulus is filled with a substantially incompressible fluid, and

which includes at least one baffle attached to the body and extending into the inner annulus in the vicinity of the bellows and the laminated elastomeric flex element.

Claims 54-55 (Canceled).

56. (Previously presented) A flexible pipe joint for conveying production fluid greater than 180 °F in a subsea environment, the flexible pipe joint comprising:

a body having a cavity;

a central pipe within the cavity and mounted to the body;

an extension pipe extending outward from the cavity of the body;

a laminated elastomeric flex element disposed within the cavity of the body and coupling the extension pipe to the body, the laminated elastomeric flex element having alternate elastomer layers and reinforcement layers; and

a heat shield disposed in the extension pipe in the vicinity of the laminated elastomeric flex element;

wherein the extension pipe has a hemispherical portion in the vicinity of the laminated elastomeric flex element and a cylindrical portion away from the laminated elastomeric flex element, the heat shield includes polymeric material, the polymeric material is disposed between the extension pipe and an end portion of the central pipe, the polymeric material includes a hemispherical portion mating with an inner profile of the hemispherical portion of the extension pipe and a cylindrical portion extending into the cylindrical portion of the extension pipe, and the polymeric material contacts the end portion of the central pipe to place the laminated elastomeric flex element in an initial state of compression.

57. (Previously presented) The flexible pipe joint as claimed in claim 56, wherein the elastomer layers include inner elastomer layers near to the extension pipe and outer elastomer layers away from the extension pipe, wherein the inner elastomer layers have a greater shear modulus than the outer elastomer layers.

58. (Previously presented) The flexible pipe joint as claimed in claim 56, wherein the elastomer layers include inner elastomer layers near to the extension pipe and outer elastomer layers away from the extension pipe, the inner elastomer layers consist essentially of peroxide cured hydrogenated nitrile butadiene rubber, and the outer elastomer layers consist essentially of vulcanized nitrile butadiene rubber.

59. (Previously presented) The flexible pipe joint as claimed in claim 56, wherein the elastomer layers include inner elastomer layers near to the extension pipe and outer elastomer layers away from the extension pipe, the inner elastomer layers consist essentially of fluoroelastomer, and outer elastomer layers consist essentially of vulcanized nitrile butadiene rubber.

60. (Previously presented) The flexible pipe joint as claimed in claim 56, wherein the reinforcement layers include inner reinforcement layers near to the extension pipe and outer reinforcement layers away from the extension pipe, and the inner reinforcement layers are corrugated or pocketed.

61. (Previously presented) The flexible pipe joint as claimed in claims 56, wherein the polymeric material is polyetheretherkeytone reinforced with glass fiber.

62. (Previously presented) The flexible pipe joint as claimed in claim 56, which further includes a multi-section ring engaging the extension pipe and disposed over the polymeric material for retaining the polymeric material in the extension pipe.

63. (Previously presented) The flexible pipe joint as claimed in claim 62 which includes at least one force-fitted pin disposed in a section of the multi-section ring and in the polymeric material.

64. (Previously presented) The flexible pipe joint as claimed in claim 62, wherein the multi-section ring is disposed under a metal retaining ring welded to the extension pipe.

65. (Previously presented) The flexible pipe joint as claimed in claim 56, wherein the hemispherical portion of the extension pipe is made of nickel-chromium-iron alloy.

66. (Previously presented) The flexible pipe joint as claimed in claim 56, wherein the body contains a bellows secured to an end of the extension pipe within the body, the body

defines an inner annulus about the bellows, and the inner annulus is filled with a substantially incompressible fluid.

67. (Previously presented) The flexible pipe joint as claimed in claim 66, wherein the substantially incompressible fluid is a polyalkylene glycol solution.

68. (Previously presented) The flexible pipe joint as claimed in claim 66, wherein the bellows is made of nickel-chromium-iron alloy.

69. (Previously presented) The flexible pipe joint as claimed in claim 66, which includes at least one baffle attached to the body and extending into the inner annulus in the vicinity of the bellows and the laminated elastomeric flex element.

70. (Previously presented) The flexible pipe joint as claimed in claim 66, wherein the body has internal fins that protrude into the inner annulus.

71. (Previously presented) The flexible pipe joint as claimed in claim 56, wherein the body has external fins for dissipation of heat from the body.